

REMARKS

Responsive to the Office action mailed May 1, 2008, applicant request entry of the foregoing amendments, consideration of the following remarks and reconsideration of the rejections set forth in said office action.

Claims 1-7 were rejected under 35 USC 112, first paragraph, because the specification did not reasonably provide enablement for any catalyst generally. Claim 1 has been amended to incorporate the exemplary catalysts previously set forth in canceled claims 8 and 9. Applicants respectfully submit that as amended, claim 1 particularly points out and distinctly claims the subject matter which applicants regard as the invention.

Claims 1-7 were rejected under 35 USC 103(a) as being unpatentable over Weisburg et al (US 2,406,648). Applicants respectfully submit that Weisberg et al. '648 fails to render obvious the present invention.

The present invention is directed toward a process to obtain ethyl lactate substantially free of water via an esterification reaction in which a mixture comprising ethyl lactate, ethanol, water and heavy products composed of unconverted lactic acid and oligomers of ethyl lactate are continuously extracted from the esterification medium, at a partial degree of conversion of the lactic acid, and subjecting this mixture to a flash separation under reduced pressure, from which two streams are obtained:

- a bottoms stream comprising lactic acid and oligomers (which can be recycled to the esterification reaction medium);
- a top stream comprising a mixture of ethyl lactate, ethanol and water;

and then subjecting this top stream to a fractional distillation, from which ethyl lactate substantially free of water is obtained.

In the present invention the starting material is lactic acid which is esterified with ethanol. The products of the esterification and unreacted starting materials are continuously withdrawn from the reaction medium before the reaction is complete. That is, the products of the esterification reaction and

unreacted starting materials are continuously withdrawn from the reaction medium when the reaction is less than 80% complete. The inventors discovered that by employing the claimed starting materials and withdrawing the products of the esterification and unreacted starting materials from the reaction medium before the reaction is complete, the following flash distillation and distillation steps provided “non-product” streams which can be recycled. In the flash distillation, which follows the esterification reaction, the bottoms stream is lactic acid which can be recycled to the esterification step. In the distillation, which follows the flash distillation, the top stream is ethanol and water which can be recycled to the esterification step, preferably after separation of the water.

Applicants respectfully submit that Weisberg et al ‘648 fails to disclose expressly or by implication such a process. Weisberg et al ‘648 discloses a process of preparing water-soluble esters of lactic acid such as butyl lactate wherein an alkali metal or alkaline earth lactate is esterified with a lower alkyl alcohol in the presence of a strong mineral acid. As set forth at column 2, lines 29- 35, the process disclosed in Weisberg et al. ‘648 unavoidably causes the formation of an alkali or alkaline earth metal salts which along with impurities in the lactate salt raw material forms a sludge which has the tendency to occlude and retain tenaciously a portion of the ester. The formation of a sludge in Weisberg et al ‘648 requires a flash distillation process to separate the ester from the sludge. The bottoms product of the flash distillation step of Weisberg et al ‘648 is an unusable sludge. Furthermore, Weisberg et al ‘648 teaches, at column 3, lines 71-72 that the esterification reaction proceeds substantially to completion.

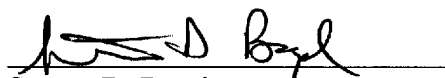
Applicants submit that Weisberg et al ‘648 fails to render obvious a process in which lactic acid is the starting material and the products of the esterification and unreacted starting materials are continuously withdrawn from the reaction medium when the reaction is less than 80% complete as claim in the preset application. The process claimed in the present application does not result in the formation of a sludge by-product. The present inventors discovered that by using lactic acid as the starting material, the formation of this “unavoidable” sludge could be avoided and a more efficient and cost effective esterification process for the formation of ethyl lactate is provided. Applicants submit that Weisberg et al. ‘648 fails to render obvious the process of the present invention which avoids the formation of “unavoidable sludge” as disclosed in Weisberg ‘684. It is submitted that there is no disclosure, either express or by implication in Weisberg et al ‘648 to use a different starting material and withdraw the

products of the esterification reaction from the esterification reactor prior to reaction completion would avoid the “unavoidable” sludge and provide an overall process in which the “non-product” streams can be recycled. There is no teaching in Weisberg et al ‘648 that serves as motivation to change the starting materials or operate the esterification reaction at less than completion as claimed in the present invention. Weisberg et al ‘648 discloses specific starting materials and a specific manner of operating the process. There is no teaching that would lead a person skilled in the art to use different starting materials and operate using different process conditions.

In view of the foregoing remarks, applicant respectfully submits that claims 1-7 of the present application are in condition for allowance and prompt favorable action is solicited.

Date: August 26, 2008

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven D. Boyd", is written over a horizontal line.

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